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How did the 2008-11 financial crisis affect work-related common mental distress? Evidence from 393 workplaces in Great Britain

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This paper analyses how the 2008-11 financial crisis relates to work-related common mental distress of those with continuous employment during the crisis. The literature connecting the 2008-11 financial crisis to common mental distress (anti-depressant drug use, suicide, etc.) generally estimates a negative effect. We used a sample of 393 workplaces from the 2011 Work and Employment Relations Study (WERS) for which employers and worker representatives agreed on that the crisis affected the workplace. WERS then provides detailed questions about how the financial crisis affected the workplace. We use these questions to show which crisis-induced work-changes are important for work-related common mental distress. In the British-context, increased workload and changes in non-financial benefits of work are most relevant worsening work-related common mental distress by 1.8 and 0.9 on a scale from 0-30 respectively.

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1. INTRODUCTION

There is a recent and growing health economics literature that analyses how macro-level economic development affects individual health (Cawley et al., 2015; Miller et al., 2009; Ruhm, 2015, 2016; Wang et al., 2018). Bradford and Lastrapes (2014) show that a one percent decline in employment is associated with a ten percent increase in the prescription of anti-depressants in the US. The systematic review by Parmar et al. (2016) confirm these findings for Europe, concluding that suicides increased and common mental distress generally worsened due to the 2008-11 financial crisis.

The World Bank estimates that the UK GDP in 2007 was $3.074 trillion dropping to $2.383 trillion in 2009 and only recovering to roughly the pre-crisis level by 2014 ($ 3.023 trillion)[1]. During the financial year 2008/09, 11.42 million working days were lost due to stress, depression and anxiety (UK Health and Safety Executive)[2]. So it is understandable that there is a large literature studying the (mental) health effects of the 2008-11 financial crisis (for brevity hereafter just referred to as crisis).

The focus of most of the present research addresses that the crisis affected common mental distress (Askitas and Zimmermann, 2015; Ayers et al., 2012; Deaton, 2012). A smaller but growing part of the literature tries to unpick the underlying mechanisms. The first part of this subset is focused on identifying how business cycles movements affect individual level wealth and income and how those changes translates into mental health changes. McInerney et al. (2013) show for example that the crisis lead to worse common mental distress and increase antidepressant use of those aged over 50. They identify lost wealth (retirement savings) as the driving factor. Currie and Tekin (2015) provide evidence that spikes in foreclosures due the crisis lead to unscheduled hospitalizations including for common mental distress problems. This literature also links these changes in individual level income and wealth to health behaviours that can affect mental health. Examples are the works by Dávalos et al. (2012) and Ásgeirsdóttir et al. (2016) who link the 2008-11 financial crisis to excessive alcohol consumption and report that alcohol consumption (in contrast to other health behaviours) did not return its pre-crisis level, respectively.

[1] The unit is 2016 dollars and conversion from Great British Pound to US dollar is done with yearly official exchange rates. The data and more information on the underlying calculations can be accessed here:

https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?cid=GPD_29&end=2016&locations=GB&start=2002 (last accessed 20th of June 2018).

[2] The 2008/09 financial year had 255 working days, so the equivalent of 44,784 full-time jobs were lost to society due to common mental health problems .The UK Health and Safety Executive provides working days lost in full-day equivalents already accounting for variation in working hours.

The second part of this literature links business cycle movements to changes in individual employment and seeks to understand how this affects mental health. The most influential study in this area is Ruhm (2000) who estimates the effect of economic conditions on suicide (and other health outcomes) using US data from 1972-1991 and state level unemployment. He finds a counter-cyclically relationship between unemployment and suicide (Ruhm, 2000). Ruhm and others then reanalyze this finding with mostly consistent results for suicides (Charles and DeCicca, 2008; Gerdtham and Ruhm, 2006; Ruhm, 2015, 2016). One of the exceptions is Haaland and Telle (2015) who find a pro-cyclical relationship in Norway. This leads to the third-strain of literature where this work fits best.

This part of the literature tries to build on the first two, and asks what it is about work that affects mental health. Fishback et al. (2007) and Gerdtham and Ruhm (2006) report findings indicating that social security systems buffer the health-effects of recessions. Ólafsdóttir et al. (2015) and Xu (2013) look at working hours as a mechanism between the financial crisis and health. Ólafsdóttir et al. (2015) analyse the effect of the crisis on smoking (not mental health) in Iceland. They consider the labour market mechanism through which the crisis could affect smoking, but their data is limited to real income and working hours as potential mechanisms. They find no evidence that links working hours or real income to the observed reduction in smoking, rather the reduction is driven by an increase in prices due to the devaluation of Icelandic currency during the crisis, as tobacco is an import product. Xu (2013) using US data finds that increases in the number of hours worked are linked with higher cigarette use, less exercise and a lower number of physician visits.

To our knowledge no study has looked at a larger number of changes within the workplace and their effects on common mental distress. This paper aims to fill this gap by using detailed questions on how the crisis affected the workplace and how employees' work-related common mental distress was affected by this. Further, while most previous work relied on surveyed individuals reporting whether or not they were affected by the crisis (Deaton, 2012; Jones et al., 2016; McInerney et al., 2013; Ólafsdóttir et al., 2015), we leverage data from three perspectives on the impact of the 2008-11 financial crisis (employees, worker representatives, managers) to reduce the potential impact of justification bias. Finally, in the absence of causal estimates in the literature and the absence of cohort and longitudinal data, our fixed effects approach offers insights into the range of relationships between specific crisis-induced changes in the workplace and common mental distress in the workplace currently not available in the literature.

2. DATA

The analysis is conducted on the 2011 Workplace Employment Relations Study (2011 WERS) which was conducted between spring 2011 and summer 2012 (Van Wanrooy et al., 2013). The 2011 WERS covered 2,680 workplaces in Britain employing 21,981 employees. Interviews were conducted with senior human resource managers and worker representatives as well as sample of up to 25 employees per workplace. The WERS 2011 asked human resource managers (for brevity referred to as managers hereafter), worker representatives and employees if and how they thought the workplace was affected by the crisis. Each of these groups was provided with a number of possible effects the crisis had on their workplace. We use the perspectives of managers and worker representatives to establish whether workplaces were affected by the 2008-11 financial crisis: if for a given workplace both managers and workplace representatives indicate that at least one change happened due to the crisis (and they did not tick the option that no changes happened), then we classified a given workplace as affected by the crisis. The motivation behind this approach is the concern that workers might try to justify their worse common mental distress with the financial crisis, even if the financial crisis was not felt at their workplace. This process is known as justification bias and has been a concern in research estimating the association of changes in the labour market on health for decades (Butler et al., 1987; Currie and Madrian, 1999; Martin, 2009; McGarry, 2004). Our approach is likely to reduce the problem of justification bias but does not necessarily solve it as employees within affected workplaces might still over-report the financial crisis to justify their state of common mental distress. Worker representatives and managers have opposing incentives to misreport whether the financial crisis affected their workplace. Therefore we assume that agreement between the two implies with more certainty that the workplace was indeed affected.

Selecting only workplaces for which worker representatives and manager report a crisis effect reduces the sample to 4,802 employees in 393 workplaces. The two main reasons for this reduction is that for 13,728 employees from 1,240 workplaces the crises was not felt, this includes employees who did not work at the surveyed workplace during the crisis. While for another 10,849 employees from 1,124 workplaces, no data for worker representatives was available. Of course, these criteria are not mutually exclusive and therefore the sample is reduced by less than the sum of the two cleaning rules. Furthermore, for 231 employees some information on key variables (gender, age, ethnicity, etc.) is missing. This leaves us with a sample of 4,802 employees and 393 workplaces that report to have been affected by the crisis giving us a sample of crisis-survivors.

Work-related common mental distress is measured at employee level with the question “Thinking of the past few weeks, how much of the time has your job made you feel each of the following?” with the possible options of tense, depressed, worried, gloomy, uneasy and miserable (Jones et al., 2016; Warr, 1990). The possible answers are then rated with the following response options and the respective value given in square brackets: “All of the time” [1], “Most of the time” [2], “Some of the Time” [3],

"Occasionally" [4] and "Never" [5]. Based on these questions a measure of work-related common mental distress is created, which ranges from 0 to 30 with higher values indicating lower levels of common mental distress.[3]

Table I presents how employees, managers and worker representatives reported how the crisis affected their workplace. The most common reaction to the crisis from an employee perspective were frozen or cut wages with a share of nearly 47% of employees reporting it. Other common reactions were increased workload with 38% or reorganized work with about a quarter of employees reporting this. The replies by managers and worker representatives are hard to compare, but the one identical category "Wages frozen or cut" is at the top of all three lists.

Further variables considered in the analysis are region (8 regions covering England, Scotland and Wales), age from 16 onwards grouped in 9 categories, whether the person is white or non-white, male or female, works in the private or public sector[4], and whether the employee submitted the survey online or via paper.

Table II offers descriptive statistics for the sample. The majority of the sample is white (93%), less than half of the sample is male and only 14% of the employees submitted the survey online.

To explore whether employees can influence how their workplace reacted to the crisis we also employ a question asked to the worker representative about their involvement in changes: "At this workplace [union / employee] representatives work closely with management when changes are being introduced." We code "Agree" and "Strongly Agree" as high-involvement workplaces and "Neither agree nor disagree", "Disagree" and "Strongly disagree" as low-involvement workplaces.

[3] We used several approaches to evaluate the suitability of the score for further analysis. We determined the intraclass correlations (ICCs) for the individual questions to gauge the size of the effect workplaces had on employees' responses. The ICCs ranged from ICC = .033 (*depressed*) to .053 (*misery*), indicating small cluster effects. We then used a principal component analysis to evaluate how much variance in the responses to the six questions would maximally be attributable to a single component, both for the original variables as well as for the responses centred around the worplace average (analogue to our fixed effects analysis). The amount of explained variance was ρ=.69 (ρ =.68 for workplace-centred variables, respectively). The results indicate that a score captures substantial parts of the inter-individual variance across the six variables and is hardly influenced by the clustered nature of the data.

[4] Private sector is defined as the workplace being part of company that has one of the following statuses: Public Limited Company, Private Limited Company, Company limited by guarantee, Partnership/ Self-proprietorship, Trust/Charity, Body established by Royal Charter or Co-operative/Mutual/Friendly society. Public sector is defined as the workplace being part of company that has one of the following statuses: Government-owned limited company/Nationalised industry/Trading Public Corporation, Public service agency, Other non-trading public corporation, Quasi Autonomous National Government Organisation as well as Local/Central Government (inc. NHS and Local Education Authorities). The status is reported by the manager and the assignment into private and public sector is adopted from the codebook for the Management Questionnaire of WERS 2011.

Table I – Workplace Changes Due To The Crisis

Change That Occurred	Mean
Employees	
Workload increased	0.377
Work was reorganized	0.271
Moved to another job	0.079
Wages frozen or cut	0.472
Non-wage benefits reduced	0.084
Contracted working hours reduced	0.026
Access to paid overtime restricted	0.226
Required to take unpaid leave	0.021
Access to training restricted	0.176
Managers	
Compulsory redundancies	0.323
Voluntary redundancies	0.453
Temporary freeze on recruitment	0.659
Postponement of plans for expansion	0.364
Wages frozen or cut	0.656
Reduction in non-wage benefits	0.150
Reduction in basic hours	0.081
Reduction in paid overtime	0.346
Required to take unpaid leave	0.043
Reduction in the use of agency staff	0.517
Increase in the use of agency staff	0.092
Reduction in training expenditure	0.425
Other action	0.565
Worker Representatives	
Redundancies	0.588
Change agency staff	0.468
Wages frozen or cut	0.707
Introduction of performance pay	0.048
Change working time arrangements	0.293
Change organization of work	0.534
Other action	0.064

Note: All options for each group are presented here. The number of employees observed is 4,802 and the number of workplaces is 393.

Table II – Descriptive Statistics for employees

	Mean	S.D.
Common mental distress	23.291	5.201
Tense	3.311	1.011
Depressed	4.121	1.051
Worried	3.751	1.041
Gloomy	3.991	1.061
Uneasy	3.941	1.051
Miserable	4.181	1.051
Region		
North East	0.061	0.231
Yorkshire and Humber	0.091	0.291
East Midlands	0.071	0.261
East Anglia	0.031	0.181
South East	0.241	0.431
South West	0.091	0.291
West Midlands	0.071	0.251
North West	0.121	0.331
Wales	0.081	0.271
Scotland	0.141	0.351
Age Groups		
16-17	0.001	0.031
18-19	0.001	0.061
20-21	0.011	0.081
22-29	0.111	0.311
30-39	0.211	0.411
40-49	0.321	0.461
50-59	0.291	0.451
60-64	0.061	0.231
>64	0.011	0.101
Ethnicity	0.931	0.261
Gender: Male	0.461	0.501
Private Sector	0.351	0.481
Online	0.141	0.351
Worker Rep. Involvement	0.741	0.441

Note: Our common mental distress variable has a minimum of 0 and a maxinum of 30, the underlying questions have five levels. All other variables are binary and are therefore limited between 0 and 1. The number of employees observed is 4,802 and the number of workplaces is 393.

3. METHODS

The baseline methodological approach is an OLS regression.

$$M_{iw} = \alpha + \beta \boldsymbol{crisis}'_{iw} + \gamma \boldsymbol{x}'_{iw} + \varepsilon_{iw} \quad (1)$$

In all equations subscript i indicates individual employees and subscript w indicates workplaces. The coefficients of interest in equation (1) are the vector of crisis effects ($\boldsymbol{crisis}$) and its association with common mental distress (M). When employing the responses from managers and worker representatives on how the crisis affected the workplace the vector of crisis effects loses the subscript i as this information is only available on workplace level. The model furthermore includes a vector of control variables ($\boldsymbol{x}$) outlined in the previous section.

The usual concern in such a model is that the variable of interest is endogenous as common mental distress could affect for example the wage of the individual (Kronenberg et al., 2017). For example some workplaces could be more resilient to recessions given workplace level characteristics such as workplace culture. Workplace culture is inherently unobservable, but given that workplace level factors are identical for all employees, a workplace fixed effect model can be estimated to account for this. In essence we are saying that workplace culture was an unobserved variable in equation (1) that was absorbed by the error term ε_{iw}. The aim is therefore to rid ε_{iw} of workplace level invariant characteristics represented by θ_w in equation (2).

$$\varepsilon_{iw} = \theta_w + \sigma_{iw} \quad (2)$$

By subtracting the workplace averages from equation (2) is transformed to:

$$\varepsilon_{iw} - \bar{\varepsilon}_{iw} = \theta_w - \bar{\theta}_w + \sigma_{iw} - \bar{\sigma}_{iw} \quad (3)$$

If θ_w is the same for the entire workplace $\theta_w = \bar{\theta}_w \rightarrow \theta_w - \bar{\theta}_w = 0$ and therefore all workplace-invariant factors, including unobservable factors like workplace culture, drop out leaving us with:

$$\ddot{M}_{iw} = \beta \ddot{\boldsymbol{crisis}}'_{iw} + \gamma \ddot{\boldsymbol{x}}'_{iw} + \ddot{\sigma}_{iw} \quad (4)$$

Reichert and Tauchmann (2017) have previously explored another concern, namely that employees in small firms are able to influence how their workplace reacts to economic shocks. They test this by splitting their sample by firm size as they have no measure of the degree of worker-involvement in managerial decision making. The exclusion of employees from small firms hardly affected their results. However, if employees can really influence how their firm reacted to the crisis, they might have included the expected effect of potential changes on their common mental distress and influenced the workplace in such a way as to minimize these. This would lead to reverse causality in which not only the reactions to the crisis affect common mental distress, but common mental distress also

determined how the workplace reacted to the crisis. WERS 2011 is a unique data source to explore the hypothesis that employees are able to or at least perceive themselves to be able to influence managerial questions. Instead of only proxying the (perceived) ability to influence managerial decisions by workplace or firm size we also test this hypothesis with questions that directly ask worker representatives about their involvement in changes at the workplace (see the last paragraph in section 2). Based on this question we can test within small and large workplaces whether or not differential relationships are found.

In all cases the error term is clustered at workplace level. It is necessary to adjust the error-term, as it is likely that the errors are correlated within workplaces, which unadjusted for could lead to misleadingly small standard errors. We assume that the error-terms between workplaces are uncorrelated. We also apply this procedure in the fixed effect estimation, because the fixed effect approach will control only for a share of the within-workplace correlation of the error-term. However, it is possible that it will not control for the entire within-workplace error correlation (Cameron and Miller, 2015). Cameron and Miller (2015) also report that if cluster sizes are small (1-25 in our case) standard errors should be based on a within-estimator compared to a least squares dummy variable estimator. To use the correct degrees of freedom for the within estimator, the xtreg command in Stata with the vce(robust) option was used (Cameron and Miller (2015), p. 331).

4. RESULTS

Table III presents the baseline results using OLS with and without controls in the model. The results show that employee-perceived crisis effects are strongly associated with employee common mental distress while manager and worker representative reported crisis effects are substantially smaller and rarely statistically distinguishable from zero. For employees the difference between estimates with and without controls is very small, we will therefore focus on the presentation with controls. In employees who remained in employment during the crisis, nearly all crisis-induced changes worsen employees' common mental distress as indicated by negative coefficients. The three strongest relationships are found for increased workload, access to training restricted, and having moved to another (internal) job. What might be surprising is that the associations relating to financial reductions (wages frozen or cut, contracted workings hours reduced, access to paid overtime restricted, required to take unpaid leave) are comparatively small with some insignificant and positive signed. For the two non-significant coefficients it must be noted though, that they were very rare occurrences in our sample (reduced contracted working hours n =125; unpaid leave n = 101), which may have reduced the precision for estimating this specific effect.

For the manager part of Table III only taking unpaid leave, reducing agency staff and reduction training expenditure are statistically significant in both the regression with and without controls, while compulsory redundancies is only statistically significant in the regression without controls. We remind the reader that in these models the crisis vector in equation (1) loses the i subscript – although the model still estimates the average association on all survey responses, the crisis-induced changes are only measured once per workplace and are the same for all individuals for one workplace. The coefficient of compulsory redundancies is positive implying that compulsory redundancies improve the common mental distress of the remaining employees, potentially because the remaining employees perceive their jobs to be safer after the departure of their colleagues. This is opposite to the findings in Reichert and Tauchmann (2017) but they analyse plant closures in Germany, which might be different from the crisis in Great Britain (GB) given the differential social security systems and labour market situations of the two countries. Reductions in training expenditure have a negative sign, i.e. the remaining employees' common mental distress is increased by this measure, which could be seen as an objective indicator of reductions in cash-flow in the company and therefore an indicator of insecurity.

In the worker representative part of Table III only one crisis-induced change shows a significant association in both regressions with and without controls, the change in agency staff worsen common mental distress. The remaining coefficients are all negative with the exception of “change organization of work” and “other action”, which is also statistically significant in the without controls regression.

Table III – OLS baseline results for the change in common mental distress due to workplace changes caused by the 2008-11 financial crisis

Change due to crisis	Without controls	With controls
Employees		
Workload increased	-1.874*** [0.170]	-1.842*** [0.168]
Work was reorganised	-0.600*** [0.190]	-0.622*** [0.187]
Moved to another job	-1.035*** [0.308]	-0.938*** [0.307]
Wages frozen or cut	-0.416*** [0.156]	-0.430*** [0.157]
Non-wage benefits reduced	-0.808*** [0.282]	-0.846*** [0.289]
Contracted working hours reduced	0.355 [0.539]	0.251 [0.538]
Access to paid overtime restricted	-0.678*** [0.188]	-0.677*** [0.186]
Required to take unpaid leave	-0.473 [0.601]	-0.399 [0.627]
Access to training restricted	-0.973*** [0.206]	-0.987*** [0.205]
Managers		
Compulsory redundancies	0.326* [0.192]	0.308 [0.211]
Voluntary redundancies	-0.207 [0.194]	-0.149 [0.200]
Temporary freeze on recruitment	-0.228 [0.218]	-0.268 [0.219]
Postponement of plans for expansion	0.201 [0.206]	0.174 [0.200]
Wages frozen or cut	-0.069 [0.196]	-0.045 [0.199]
Reduction in non-wage benefits	0.122 [0.258]	0.074 [0.270]
Reduction in basic hours	0.217 [0.290]	0.173 [0.308]
Reduction in paid overtime	-0.171 [0.200]	-0.169 [0.194]
Required to take unpaid leave	-0.78* [0.454]	-0.777* [0.455]
Reduction in the use of agency staff	-0.395* [0.204]	-0.366* [0.201]
Increase in the use of agency staff	-0.326 [0.322]	-0.289 [0.316]
Reduction in training expenditure	-0.484** [0.193]	-0.449** [0.196]
Other action	-0.207 [0.196]	-0.135 [0.190]
Worker Representatives		
Redundancies	-0.080 [0.202]	-0.058 [0.197]
Change agency staff	-0.368* [0.196]	-0.332* [0.193]
Wages frozen or cut	-0.172 [0.205]	-0.256 [0.202]
Introduction of performance pay	-0.281 [0.477]	-0.227 [0.454]
Change working time arrangements	-0.328 [0.242]	-0.265 [0.238]
Change organisation of work	0.017 [0.200]	0.027 [0.198]
Other action	0.539* [0.320]	0.292 [0.318]

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard error reported in square brackets. The error term is clustered at workplace level. Each section (employees, mangers and worker representatives) represent two separate regression on employee level with and without controls. The dependent variable is a measure of common mental distress ranging from 0 to 30. Lower values of the dependent variable indicate worse common mental distress.The controls are region (8 regions for England, Scotland and Wales), age from 16 onwards grouped in 9 categories, whether the person is white or non-white, male or female, works in the private or public sector , and whether the employee submitted the survey online or via paper. The number of employees observed is 4,802 and the number of workplaces is 393.

It is possible that some workplaces have better or worse workplace cultures that affected the results or particularly gifted managers or worker representatives. All of these factors, while difficult to observe, are fixed within workplaces and therefore can be accounted for by introducing workplace fixed effects.

Table IV presents the results for this fixed effect estimation. Given that workplace representative and manager replies do not vary within workplaces that part of the table drops out and only the top part relating to employee reported crisis effects remains. The share of the estimated variance of the overall error accounted for by the workplace effect (rho) is 0.135 and 0.134 respectively, which indicates that the workplace fixed effect is not extremely important and thus unobservable workplace-invariant factors such as workplace culture or particularly gifted managers or worker representatives are not likely to bias the estimation substantially. It appears that in most instances the same aspects of work matter for mental distress whether or not we account for unobservable factors workplace-invariant factors. On page 188 of their work Reichert and Tauchmann (2017) for example state that one of their key assumptions is "that firm-level changes in the workforce are exogenous events from the perspective of an individual employee". Even though, we observe workplaces and not firms, our results appear to support that assumption.

The three largest associations from the OLS regression (Table III) remain important and relatively unchanged in size, even when only considering within-workplace variation (increased workload, access to training restricted, and reductions of non-wage benefits). However, they are joined by having to take unpaid leave, which is now the second-strongest effect, nearly quadrupling in size compared to the OLS result, but is only significant when considering control variables and as noted previously, due to the small number of instances, very imprecisely measured. Another important change occurs for wages frozen or cut, which roughly doubles in size.

Across OLS and fixed effects regressions nearly all of the effects of the crisis covered in the survey show a potential negative impact on work-related common mental distress. Only the reduction in contracted working hours was not significant in any of the analyses, which may be due to rarity in our sample. When controlling for unobserved workplace-invariant factors via fixed effects regression, changes are especially observed for requiring to take unpaid leave and freezing/cutting of wages, which become much more important than in the OLS regression. It appears that financial factors are more relevant within workplace than between workplaces. This is potentially due to differential wage distribution between workplaces.

Table IV – Effect workplace changes caused by the 2008-11 financial crisis on common mental distress after introducing workplace fixed effect

Change due to crisis	Without controls	With controls
Workload increased	-1.808*** [0.171]	-1.787*** [0.173]
Work was reorganised	-0.543*** [0.200]	-0.551*** [0.198]
Moved to another job	-1.101*** [0.306]	-1.049*** [0.304]
Wages frozen or cut	-0.894*** [0.164]	-0.836*** [0.166]
Non-wage benefits reduced	-0.843*** [0.308]	-0.804** [0.312]
Contracted working hours reduced	0.117 [0.566]	0.096 [0.580]
Access to paid overtime restricted	-0.649*** [0.196]	-0.634*** [0.196]
Required to take unpaid leave	-1.440 [0.874]	-1.510* [0.868]
Access to training restricted	-0.923*** [0.214]	-0.899*** [0.214]
rho	0.135	0.134

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard error reported in square brackets. The error term is clustered at workplace level. Manager and worker representative results are not presented as no workplace fixed effect can be estimated given that the manager and worker representative replies are fixed per workplace. The columns present the estimates with and without controls. The dependent variable is a measure of common mental distress ranging from 0 to 30. Lower values of the dependent variable indicate worse common mental distress. The controls are region (8 regions for England, Scotland and Wales), age from 16 onwards grouped in 9 categories, whether the person is white or non-white, male or female, works in the private or public sector, and whether the employee submitted the survey online or via paper. The number of employees observed is 4,802 and the number of workplaces is 393.

Finally, we employed two tests to investigate the potential for reverse causation of employees influencing implemented changes at their workplaces. Table V presents fixed effect regression results with workplaces split into low- and high-involvement workplaces based on the statement of the worker representative (see columns of Table V). We first re-ran the fixed effects regression with all employees in those two categories and again we find negative signs for nearly all crisis-induced changes. In companies that are classified as "high involvement", reducing non-wage benefits and being required to take unpaid leave correlate negatively with common mental distress. Whether or not a workplace is classified as low- or high-involvement by the representative does not generally moderate the relationship between perceived crisis-induced changes at the workplace and workplace related common mental distress, but it may do so for specific types of changes.

Reichert and Tauchmann (2017) have suggested that employees in small firms are able to influence how their workplace reacts to economic shocks. The results in Table V provide some support for that idea, in high involvement small companies reorganised work has a small and statistically insignificant coefficient. In high involvement large companies reorganised work has a statistically significant negative signed coefficient. The coefficient for the case of low involvement large companies is even larger and also statistically significant. However, the coefficient for the case of low involvement small companies is qualitatively of similar size, but less precisely estimated.

The cut-off is the median firm size in WERS 2011, which is 244 employees. Within all four groups of the combination of these two indictors of involvement the signs of all but three crisis-induced changes remain negative. The coefficients with positive signs are (1) required to take unpaid leave in low involvement large companies; (2) access restrictions to training in low involvement large companies;

and 3) contracted working hours having been reduced in high involvement large companies for all employees and for employees in small low involvement companies.

A number of coefficients are not significant anymore, which can be due to loss of precision with smaller sample sizes (especially in the low involvement group of companies). Nevertheless, if it were possible for employees in high-involvement small companies to influence their company's decisions more, then we would expect their regression coefficients to indicate weaker connections than in the other three cases. However, overall there is no pattern suggesting this, if at all only for two workplace changes does the coefficient pattern point in that direction (reorganisation of work and reduction of hours). Due to the non-randomized nature of our data, limited control variables and high number of comparisons this can only be a descriptive assessment, but to us it suggests that if workers influence was used in our sample to re-structure work places to their liking and demands, then this did not happen uniformly.

Overall, we find that in a survey of employee's who remained employed during the crisis in workplaces that were likely hit by the crisis that several of the crisis-induced changes correlated with worse/more common mental distress as predicted. Across OLS and fixed effects regression increased workload, followed by access restrictions to training and moving to another (internal) job, emerged as the strongest predictors. The OLS regressions further suggested that crisis-induced changes remembered by management and worker representatives were not strongly correlated with employees' common mental distress, which points to the perception of such changes by employees being an important factor.

Finally, there appears to be very little evidence that workplace culture, quality of management or quality of representation affect the results or that the results are driven by employees influencing how the workplace reacted to the crises.

Table V – Fixed effect regression results with controls exploring employee influence on manager decisions

Change due to 2008 financial crisis	Low Involvement	High Involvement
	All Employees	
Workload increased	-1.518*** [0.336]	-1.885*** [0.203]
Work was reorganised	-1.023** [0.420]	-0.406* [0.225]
Moved to another job	-1.440** [0.696]	-0.905*** [0.332]
Wages frozen or cut	-0.621** [0.296]	-0.869*** [0.198]
Non-wage benefits reduced	-1.160 [0.701]	-0.717** [0.347]
Contracted working hours reduced	-0.556 [1.497]	0.249 [0.635]
Access to paid overtime restricted	-0.773* [0.407]	-0.597*** [0.227]
Required to take unpaid leave	-1.267 [2.181]	-1.478* [0.866]
Access to training restricted	-0.585 [0.409]	-1.020*** [0.251]
rho	0.137	0.131
N (employees)	1,231	3,571
N (workplaces)	101	292
	Employees in small companies	
Workload increased	-1.163** [0.452]	-1.866*** [0.322]
Work was reorganised	-1.012 [0.639]	-0.147 [0.332]
Moved to another job	-2.411** [1.061]	-1.627*** [0.473]
Wages frozen or cut	-0.501 [0.404]	-0.818*** [0.305]
Non-wage benefits reduced	-0.772 [0.842]	-0.865 [0.536]
Contracted working hours reduced	2.946* [1.677]	-0.435 [0.922]
Access to paid overtime restricted	-0.558 [0.530]	-0.358 [0.344]
Required to take unpaid leave	-1.566 [2.523]	-1.957 [1.338]
Access to training restricted	-1.193** [0.548]	-1.202*** [0.392]
rho	0.116	0.136
N (employees)	687	1,718
N (workplaces)	52	139
	Employees in large companies	
Workload increased	-1.933*** [0.508]	-1.944*** [0.261]
Work was reorganised	-1.126* [0.564]	-0.693** [0.304]
Moved to another job	-0.521 [0.904]	-0.317 [0.440]
Wages frozen or cut	-0.775* [0.433]	-0.856*** [0.252]
Non-wage benefits reduced	-2.010** [0.977]	-0.564 [0.453]
Contracted working hours reduced	-4.017*** [1.212]	1.629*** [0.410]
Access to paid overtime restricted	-1.106* [0.631]	-0.830*** [0.304]
Required to take unpaid leave	0.245 [3.273]	-0.495 [0.832]
Access to training restricted	0.067 [0.624]	-0.827** [0.324]
rho	0.175	0.128
N (employees)	544	1,853
N (workplaces)	49	153

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard error reported in square brackets. The error term is clustered at workplace level. The controls are age from 16 onwards grouped in 9 categories, whether the person is white or non-white, male or female, works in the private or public sector , and whether the employee submitted the survey online or via paper.

4.1.ROBUSTNESS CHECKS

We conduct some checks whether our results are driven by gender as both mental health behaviour and labour market patterns vary a lot with gender (Breuer, 2015; Cawley et al., 2015). Thus, we re-run the analysis reported in the right column of Table III by gender (an additional robustness analysis accounting for heterogeneity in the dependent variable is presented in the online appendix). Table VI presents the results split by gender, comparing these results to the right column of Table III point to some interesting associations. Since the previous analysis showed little difference between FE and OLS results (see discussion of Table III & Table IV), we again report OLS results here to report results on all three perspectives on crisis-induced changes

Increased workload remains the crisis-induced work change with the largest coefficient for both men and women. However, some of the statistically significant results in Table III are driven by one gender and not the other. Males drive the associations relating to (financial) work-benefits (frozen or cut wages, reduced non-wage benefits and restricted access to paid overtime). Women on the other side drive associations that could be summarized as “fear of unemployment” (reorganisation of work, moved to another job and access restrictions to training).

These were all employee self-reported crisis changes, considering the changes reported by managers and worker representatives all the previously statistically significant results are driven by females, except a manager-reported reduction in training expenses. Again the associations appear to be related to a concern about being employed (temporary freeze on recruitment, postponement of expansion plans, required to take unpaid leave, reduction in use of agency staff, increase in the use of agency staff, change in agency staff). The differences are potentially related to different work and employment patterns along gender lines/across gender groups (Goldin, 2014; Manning and Petrongolo, 2008). A potential underlying reason for this are classical gender roles with males being in charge of providing economic means of survival.

Table VI – OLS results for the change in common mental distress due to workplace changes caused by the 2008-11 financial crisis by gender

Change due to crisis	Male	Female
Employees		
Workload increased	-1.697*** [0.249]	-1.989*** [0.220]
Work was reorganised	-0.294 [0.273]	-0.873*** [0.245]
Moved to another job	-0.687 [0.484]	-1.182*** [0.387]
Wages frozen or cut	-0.536** [0.246]	-0.309 [0.202]
Non-wage benefits reduced	-1.107*** [0.366]	-0.571 [0.444]
Contracted working hours reduced	0.439 [0.838]	0.093 [0.600]
Access to paid overtime restricted	-1.002*** [0.285]	-0.351 [0.258]
Required to take unpaid leave	-0.856 [0.933]	0.251 [0.766]
Access to training restricted	-0.198 [0.306]	-1.617*** [0.279]
Managers		
Compulsory redundancies	0.289 [0.292]	0.384 [0.268]
Voluntary redundancies	0.005 [0.281]	-0.279 [0.253]
Temporary freeze on recruitment	0.036 [0.308]	-0.492* [0.265]
Postponement of plans for expansion	-0.178 [0.278]	0.478* [0.249]
Wages frozen or cut	-0.126 [0.266]	0.037 [0.272]
Reduction in non-wage benefits	0.046 [0.354]	0.158 [0.349]
Reduction in basic hours	0.352 [0.455]	-0.234 [0.394]
Reduction in paid overtime	-0.308 [0.260]	-0.026 [0.249]
Required to take unpaid leave	-0.214 [0.567]	-1.217* [0.672]
Reduction in the use of agency staff	0.039 [0.274]	-0.712*** [0.257]
Increase in the use of agency staff	0.530 [0.376]	-0.949** [0.445]
Reduction in training expenditure	-0.561* [0.287]	-0.470* [0.239]
Other action	0.189 [0.273]	-0.444* [0.236]
Worker Representatives		
Redundancies	-0.070 [0.240]	0.002 [0.258]
Change agency staff	-0.043 [0.239]	-0.591** [0.259]
Wages frozen or cut	-0.332 [0.261]	-0.170 [0.273]
Introduction of performance pay	-0.295 [0.654]	-0.191 [0.521]
Change working time arrangements	-0.057 [0.282]	-0.443 [0.304]
Change organisation of work	0.112 [0.255]	-0.004 [0.267]
Other action	-0.035 [0.475]	0.561 [0.433]
N (employees)	2,192	2,610
N (workplaces)	366	370

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard error reported in square brackets. The error term is clustered at workplace level. Each section (employees, mangers and worker representatives) represent two separate regression on employee level one for men and one for females. The dependent variable is a measure of common mental distress ranging from 0 to 30. Lower values of the dependent variable indicate worse common mental distress.The controls are region (8 regions for England, Scotland and Wales), age from 16 onwards grouped in 9 categories, whether the person is white or non-white, works in the private or public sector , and whether the employee submitted the survey online or via paper.

5. DISCUSSION

In this paper we study how the crisis affected work-related common mental distress of employees who were in continuous employment during the crisis. Many previous studies only explore the financial dimensions as a causal connector between the crisis and common mental distress (McInerney et al., 2013; Ólafsdóttir et al., 2015). Our study adds to this by exploring a large host of factors that could be triggered by the crisis and worsen common mental distress.

Indeed, no prior work has considered such a large number of changes within workplaces and their effects on common mental distress. We fill this gap by using detailed questions on how the crisis affected the workplace and how employees' work-related common mental distress was affected by this. Additionally, while most previous work relied on surveyed individuals reporting whether or not they were affected by the crisis (Deaton, 2012; Jones et al., 2016; McInerney et al., 2013; Ólafsdóttir et al., 2015), we leverage data from three perspectives on the impact of the 2008-11 financial crisis (employees, worker representatives, managers) to reduce the potential impact of justification bias.

We find that the 2008-11 financial crisis affected employee work-related common mental distress more strongly via an increase in workload, a factor that has been absent from the economics debate so far. On the other hand financial factors such as reduced wages only appear to be one of many factors connecting the crisis to reductions in common mental distress.

The results presented here are limited to the 2008-11 financial crisis. Though, Ruhm (2016) has shown that the health effect of crisis is similar to that of less severe economic downturns. It is therefore possible that the findings presented here are generalizable beyond the 2008-11 financial crisis.

A limitation of this study is that we only consider crisis-“survivors” who are continuously employed. It is likely that the common mental distress of those becoming unemployed due to the crisis was adversely affected (Breuer, 2015; Parmar et al., 2016). Nevertheless, previous research suggests that it is not only unemployment that affects mental health (Clark et al., 2010). Many of the effects of the crisis covered in the survey of employees can be seen as indicators of increased job insecurity and potential precariousness. Previous research has shown that both precariousness and unemployment are independent contributors to effects on mental health (Julià et al., 2017; Kim and von dem Knesebeck, 2015). Precariousness is argued to be predictive of mental illness in the workforce (Han et al., 2017) and specifically contractual changes that increase the perceived precariousness of jobs have a negative impact on mental health (Moscone et al., 2016) and workplace related perceptions (Van Aerden et al., 2016).

We do not make any causal claim, because employees studied here are not randomly affected by the crisis. The potential of bias due to more resilient employees being continuously employed remains as well as the possibility that employees select into certain jobs conditional on their common mental distress. The ideal solution would be to have a measure of workplace culture that could be added to the

model or instrumental variables that determine how the workplace reacted to the crisis but does not affect the employee common mental distress, other than indirectly through the workplace reaction to the crisis. An alternative approach to tackle that some employees are more resilient than others would be to account for baseline levels of mental distress, but unfortunately WERS does not provide observations for the same individuals over time. A similar concern are buffer-mechanisms. Wealth for example is not observable for us and might buffer the effect between crisis-induced workplace changes and common mental distress with the wealthier employees being less affected by the crisis-induced workplace change than the less wealthy employees. However, in the absence of causal estimates in the literature and the unavailability of better data, our fixed effects approach offers insights into the relationships between specific crisis-induced changes in the workplace and common mental distress in the workplace currently not available in the literature.

Finally, the definition of mental health and illness in a general population is not straightforward (Böhnke and Croudace, 2016; Stewart-Brown et al., 2015). In our case the survey assessed as specific component, the amount of job-related mental distress an employee experiences. While the questions cover fairly typical adjectives used in other instruments as well (Stochl et al., 2016), they cover only negative descriptors, which means that an assessment of positive mental health was not possible (Böhnke and Croudace, 2016).

To conclude, managers and worker representatives might have perceived the economic literature so far in way that implied cutting non-financial benefits such as increasing workload as the least-worst option in reacting to a recession. This study raises some doubt whether this is the best course of action. Indeed managers should seek to balance reductions in necessary monetary and non-monetary reductions with respect to the mental distress of their staff. The future work on the effect of the financial crisis on mental health should invest more effort into exploring the causal chain between the financial crisis and their respective outcome to test the replicability of these results in other context. A better understanding of the mechanisms could then be translated into concrete policy recommendations.

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APPENDIX A: INDIVIDUAL QUESTIONS OF THE COMMON MENTAL DISTRESS INDEX

The following offers a question-by-question sensitivity analysis of the responses to the individual questions of the mental distress index (Jones et al., 2016; Warr, 1990). These results are presented as an online appendix for two reasons, the level of the theoretical argument and the scaling of the dependent variables.

First, the index offers a more generalizable summary of the continued experience of common mental distress in the workplace since it does depend less on individuals' propensities to experience specific symptoms or their specific interpretations of an individual adjective. This interpretation is in line with the common use of such indices in epidemiology and individual differences research and especially such adjective lists have been shown to be largely exchangeable indicators for common mental distress (e.g., Böhnke and Croudace (2016); Jones et al. (2016); Stochl et al. (2016); Warr (1990)). The argument presented in the main paper connecting crisis-induced changes at the workplace and work-related common mental distress is on the level of this more abstract variable. But relationships between individual indicators and specific workplace related changes might be interesting for future research in the area.

Second, applying a fixed effects framework to the individual, ordinal question responses may lead to biases in the estimation of the relationships (Liddell & Kruschke, 2018). Averaging question responses, subtracting workplace averages from individual responses, and applying an OLS framework all assume that the dependent variable is interval-scaled. This is clearly not the case, but for comparability with the results of the main paper, this approach was retained.

Table A1 splits the mental distress variable into its six parts (tense, depressed, worried, gloomy, uneasy and misery). Overall, we examine nine crisis-induced workplace changes and their respective associations are quite homogenous in magnitude and precision across the six indicators of mental distress. For three of the crisis-induced workplace changes the coefficient is significant no matter what the outcome is: Increases in workload, reduction of non-work benefits, and restrictions to access training are all connected to statistically significant increases in common mental distress. Being required to take unpaid leave is not significant with large standard errors independent of the outcome variable.

For three further crisis-induced changes significant relationships are found for five out of six outcome variables. Reorganising work and moving to another job were not connected with feeling "tense" and cutting or freezing wages was not connected to "misery". The two crisis-induced changes that remain are a reduction in contracted working hours and a restriction in paid overtime. A reduction in contracted working hours is highly significant with a large and positive coefficient in the case of tense being the outcome, but in all other cases being insignificant with smaller coefficients. Access

restrictions to paid overtime showed consistently negative coefficients, but insignificant when tense and worried are the outcomes.

Table A1 – Workplace fixed-effect regression results for the change in each question underlying the common mental distress measure due to workplace changes caused by the 2008-11 financial crisis

	Tense	Depressed
Workload increased	-0.425*** [0.033]	-0.283*** [0.037]
Work was reorganised	-0.039 [0.039]	-0.082** [0.040]
Moved to another job	-0.102* [0.054]	-0.195*** [0.067]
Wages frozen or cut	-0.132*** [0.035]	-0.142*** [0.035]
Non-wage benefits reduced	-0.144** [0.059]	-0.113* [0.061]
Contracted working hours reduced	0.117 [0.098]	0.012 [0.127]
Access to paid overtime restricted	-0.072* [0.038]	-0.138*** [0.042]
Required to take unpaid leave	-0.261* [0.152]	-0.237 [0.171]
Access to training restricted	-0.180*** [0.039]	-0.108** [0.046]
	Worried	Gloomy
Workload increased	-0.328*** [0.036]	-0.236*** [0.037]
Work was reorganised	-0.091** [0.041]	-0.138*** [0.041]
Moved to another job	-0.168*** [0.060]	-0.162** [0.065]
Wages frozen or cut	-0.159*** [0.034]	-0.125*** [0.033]
Non-wage benefits reduced	-0.139** [0.058]	-0.147** [0.064]
Contracted working hours reduced	0.006 [0.100]	0.033 [0.121]
Access to paid overtime restricted	-0.069* [0.039]	-0.135*** [0.041]
Required to take unpaid leave	-0.171 [0.184]	-0.117 [0.168]
Access to training restricted	-0.142*** [0.042]	-0.176*** [0.046]
	Uneasy	Misery
Workload increased	-0.292*** [0.038]	-0.224*** [0.037]
Work was reorganised	-0.120*** [0.041]	-0.082** [0.040]
Moved to another job	-0.209*** [0.059]	-0.213*** [0.067]
Wages frozen or cut	-0.166*** [0.034]	-0.112*** [0.034]
Non-wage benefits reduced	-0.146** [0.064]	-0.116* [0.068]
Contracted working hours reduced	0.594 [0.111]	-0.013 [0.134]
Access to paid overtime restricted	-0.075* [0.040]	-0.145*** [0.042]
Required to take unpaid leave	-0.514*** [0.196]	-0.211 [0.160]
Access to training restricted	-0.166*** [0.044]	-0.126*** [0.045]

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard error reported in square brackets. The error term is clustered at workplace level. The controls are region (8 regions for England, Scotland and Wales), age from 16 onwards grouped in 9 categories, whether the person is white or non-white, male or female, works in the private or public sector , and whether the employee submitted the survey online or via paper. The number of employees observed is 4,802 and the number of workplaces is 393.

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